AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

1. (Original) A method of providing corrected values of gain and level coefficients of a set of correction coefficients for a scanning detector array, the scanning detector array comprising a plurality of detector channels, the method comprising the steps of:

modifying first values of the gain and level coefficients using at least one frame of image data collected by the scanning detector array from out-of-focus multiple-temperature imagery; and

determining updated values of the gain and level coefficients using a scene-based non-uniformity correction (SBNUC) routine applied to scene data corresponding to focused scene imagery.

2. (Original) The method of claim 1, wherein the step of modifying first values of the gain and level coefficients comprises applying said SBNUC routine to the frame of image data collected from out-of-focus multiple temperature imagery.

3. (Currently Amended) The method of claim 1, wherein said step of determining updated values of the gain and level coefficients using the SBNUC routine comprises the steps of:

acquiring a frame of said scene data corresponding to focused scene imagery;

applying a response correction to the frame of scene data using existing values of the gain and level coefficients to provide a corrected frame of scene data; and

adjusting the existing values of the gain and level coefficients using the ~~the~~ SBNUC routine applied to the corrected frame of scene data, wherein the existing values of the gain and level coefficients are replaced with updated values.

4. (Original) The method of claim 3, wherein said step of adjusting the existing values of the gain and level coefficients is carried out while displaying a corrected scene image corresponding to the corrected frame of scene data.

5. (Original) The method of claim 3, wherein the set of correction coefficients includes moment coefficients, and wherein said step of applying a response correction to the frame of scene data includes using the moment coefficients.

6. (Original) The method of claim 3, wherein the step of adjusting the existing values of the gain and level coefficients using the SBNUC routine comprises the steps of:

generating a preliminary level correction factor for each detector channel using a frame of scene data;

generating a gain correction factor for each detector channel using the frame of scene data;

generating a gain-induced level correction factor for each detector channel based upon the gain correction factor; and

updating the existing values of the gain and level coefficients for each detector channel using the preliminary level correction factor, the gain-induced level correction factor, and the gain correction factor for each channel.

7. (Original) The method of claim 6, wherein the step of updating the existing values of the gain and level coefficients comprises:

adding the preliminary level correction factor and the gain-induced level correction factor for each channel, thereby forming a sum corresponding to each detector channel;

subtracting the sum from the existing value of the level coefficient for each detector channel to form the updated value of said level coefficient; and

multiplying the existing value of the gain coefficient for each channel by the gain correction factor corresponding to that channel to form the updated value of the gain coefficient for each detector channel.

8. (Original) The method of claim 3, wherein said steps of acquiring a frame of scene data, applying a response correction, and adjusting the existing values of the gain and level coefficients are carried out sequentially in that order.

9. (Original) The method of claim 8, wherein said steps of acquiring a frame of scene data, applying a response correction, and adjusting the existing values of the gain and level coefficients are repeated iteratively such that the updated values of the gain and level coefficients converge to respective stable values.

10. (Original) The method of claim 1, further comprising:

adjusting initial values of the level coefficients of the set of correction coefficients using an initial frame of image data collected by the scanning detector array from a predetermined source, said adjusting providing the first values of the level coefficients.

11. (Original) The method of claim 10, wherein the predetermined source is a bland source having a substantially uniform spatial structure and a substantially uniform temperature.

12. (Original) A scene-based non-uniformity correction (SBNUC) method for correcting values of gain and level coefficients of a set of correction coefficients for a scanning detector array, the scanning detector array comprising a plurality of detector channels, the method comprising the steps of:

generating a preliminary level correction factor for each detector channel using a frame of input scene data;

generating a gain correction factor for each detector channel using the frame of input scene data;

generating a gain-induced level correction factor for each detector channel based upon the gain correction factor; and

updating existing values of the gain and level coefficients for each detector channel using the preliminary level correction factor, the gain-induced level correction factor, and the gain correction factor for each detector channel.

13. (Original) The method of claim 12, wherein the steps of generating a preliminary level correction factor for each detector channel, generating a gain correction factor for each detector channel, generating a gain-induced level correction factor for each detector channel, and updating existing values of the gain and level coefficients are repeated iteratively using successive frames of input scene data such that updated values of the gain and level coefficients converge to respective stable values.

14. (Original) The method of claim 12, wherein the step of updating the existing values of the gain and level coefficients comprises:

adding the preliminary level correction factor and the gain-induced level correction factor for each channel, thereby forming a sum corresponding to each detector channel;

subtracting the sum from the existing value of the level coefficient for each detector channel to form an updated value of said level coefficient; and

multiplying the existing value of the gain coefficient for each channel by the gain correction factor corresponding to that channel to form an updated value of the gain coefficient for each detector channel.

15. (Original) The method of claim 12, wherein the step of generating a preliminary level correction factor for each channel comprises:

applying a first vertical high pass filter to the frame of input scene data to generate a frame of first high-passed data;

applying a horizontal infinite impulse response filter to the frame of first high-passed data to generate a frame of second high-passed data;

applying thresholding based upon the frame of first high-passed data and the frame of second high-passed data to generate a frame of thresholded data; and

averaging the values of pixels in each row of a frame of data generated from the previous step to generate row averages to provide preliminary level correction factors.

16. (Original) The method of claim 15, further comprising the step of:

applying a second vertical high pass filter to the row averages to generate high-passed row averages, the high-passed row averages being used as the preliminary level correction factors.

17. (Original) The method of claim 15, further comprising the step of:

applying a vertical null-pixel filter to the frame of thresholded data prior to said averaging step to generate a frame of null-pixel-filtered data, wherein the vertical null-pixel filter identifies null pixels of the frame of thresholded data having values of zero and assigns vertically adjacent pixels within a predetermined number of pixels of the null pixels to have values of zero.

18. (Original) The method of claim 17, wherein the predetermined number of pixels is one.

19. (Original) The method of claim 15, wherein the first vertical high pass filter has a kernel of d1 x (-1/3, 2/3, -1/3) and wherein the second high pass filter has a kernel of d2 x (-1/3, 2/3, -1/3), where d1 and d2 are damping factors.

20. (Original) The method of claim 19, wherein d1 is in the range of approximately 0.5-0.95 and wherein d2 is approximately 1.0.

21. (Original) The method of claim 15, wherein the averaging is conditional averaging such that a row average is calculated if a number of non-zero pixels in that row is greater than a predetermined minimum number, the row average being calculated based upon the number of non-zero pixels, and wherein the row average is given an assigned value otherwise.

22. (Original) The method of claim 21, wherein the predetermined minimum number is in the range of approximately 0.25-0.8 times a number of pixels in each row.

23. (Original) The method of claim 21, wherein the assigned value is zero.

24. (Original) The method of claim 15, wherein said thresholding comprises the steps of:

for each pixel of the frame of first high-passed data, making a first determination of whether an absolute value of said pixel value of the frame of first high-passed data is greater than zero and less than a first threshold value, and making a second determination of whether an absolute value of a difference between said pixel value of the frame of first high-passed data and a pixel value of a corresponding pixel of the frame of second high-passed data is less than a second threshold value;

assigning a corresponding pixel value of the frame of thresholded data to have said pixel value of the frame of first high-passed data if both the first and second determinations are true; and

giving the corresponding pixel value an assigned value otherwise.

25. (Original) The method of claim 24, wherein assigned value is zero.

26. (Original) The method of claim 24, wherein the first threshold value is in the range of approximately 1-1.5 times a temporal noise value.

27. (Original) The method of claim 26, wherein the second threshold value is in the range of approximately 3-4 times the temporal noise value.

28. (Original) The method of claim 12, wherein the step of generating a gain correction factor for each detector channel comprises the steps of:

applying high-pass filtering and thresholding to the frame of input scene data;

for each row of a frame of data generated from the previous step, identifying positive pixel values and negative pixel values;

for each row of the frame of input scene data, calculating a row average of the pixel values of the frame of input scene data corresponding to the positive pixel values (AVG POS), and calculating a row average of the pixel values of the frame of input scene data corresponding to the negative pixel values (AVG NEG);

for each row of the frame of input scene data, comparing AVG POS to AVG NEG; and

determining a gain correction factor for each detector channel corresponding to each row of the frame of input scene data based upon said comparing AVG POS to AVG NEG.

29. (Original) The method of claim 28, further comprising the step of:

applying a vertical null-pixel filter prior to said step of identifying positive pixel values and negative pixel values, wherein the vertical null-pixel filter identifies null pixels of the frame of thresholded data having values of zero and assigns vertically adjacent pixels within a predetermined number of pixels of the null pixels to have values of zero.

30. (Original) The method of claim 29, wherein the predetermined number of pixels is one.

31. (Original) The method of claim 26, wherein calculating a row average is conditional such that he row average is calculated if a number of non-zero pixels in that row is greater than a predetermined minimum number, the row average being calculated based upon the number of non-zero pixels, and wherein the row average is given an assigned value otherwise.

32. (Original) The method of claim 31, wherein the predetermined minimum number is in the range of approximately 0.25-0.8 times a number of pixels in each row.

33. (Original) The method of claim 31, wherein the assigned value is zero.

34. (Original) The method of claim 28, wherein said gain correction factors are preliminary gain correction factors and wherein the method further comprises the step of:

applying a high-pass filter to the array of preliminary gain correction factors.

35. (Original) The method of claim 34, wherein the high pass filter has a kernel of d x (-1/3, 2/3, -1/3), wherein d is a damping factor.

36. (Original) The method of claim 28, wherein said step of comparing and said step of determining together comprise the steps of:

calculating a difference between AVG POS and AVG NEG for each row (i) of the frame of input scene data; and

assigning a value to each gain correction factor, G(i), based upon the following conditions:

if n2 > (AVG POS)-(AVG NEG) > n1, then G(i)=1-Ginc/D;

if n2 > (AVG NEG)-(AVG POS) > n1, then G(i)=1+Ginc/D;

if (AVG POS)-(AVG NEG) > n2, then G(i)=1-Ginc;

if (AVG NEG)-(AVG POS) > n2, then G(i)=1+Ginc;

if (AVG NEG)=0 or if (AVG POS)=0, then G(i)=1; and

G(i)=1 otherwise,

wherein n2>n1, Ginc is a predetermined gain-correction step size, and D is a divisor factor greater than 1.

37. (Original) The method of claim 36, wherein n2 is approximately 4-8 times greater than n1.

38. (Original) The method of claim 36, wherein Ginc is in the range of approximately 0.01-0.001 and wherein D is in the range of approximately 2-16.

39. (Original) The method of claim 36, wherein said gain correction factors, G(i), are preliminary gain correction factors and wherein the method further comprises the step of:

applying a high pass filter to the array of preliminary gain correction factors, G(i), to generate the gain correction factors, G'(i), for the detector channels of the scanning detector array.

40. (Original) The method of claim 12, wherein said step of generating a gain-induced level correction factor for each detector channel comprises the steps of:

applying high-pass filtering and thresholding to the frame of input scene data to provide a frame of thresholded data;

for a frame of data generated from the previous step, identifying positive pixel values and negative pixel values;

calculating a total average pixel value (TOT AVG) of pixels of the frame of input scene data corresponding to said positive pixel values and said negative pixel values; and

calculating the gain-induced level correction factor for each detector channel based upon TOT AVG and the gain correction factor for each detector channel.

41. (Original) The method of claim 40, wherein the gain-induced level correction factor for each detector channel is equal to the product (TOT AVG) x (1 - gain correction factor for each detector channel).

42. (Original) The method of claim 40, further comprising the step of:

applying a vertical null-pixel filter to the frame of thresholded data prior to said step of identifying positive pixel values and negative pixel values, to generate a frame of null-pixel-filtered data, wherein the vertical null-pixel filter identifies null pixels of the frame of thresholded data having values of zero and assigns vertically adjacent pixels within a predetermined number of pixels of the null pixels to have values of zero.

43. (Original) The method of claim 42, wherein the predetermined number of pixels is one.

44. (Original) An apparatus for providing corrected values of gain and level coefficients of a set of correction coefficients for a scanning detector array, comprising:

a processor unit coupled to a scanning detector array, the processor unit being configured to:

modify first values of the gain and level coefficients using at least one frame of image data collected from out-of-focus multiple-temperature imagery by the scanning detector array; and

determine updated values of the gain and level coefficients using a scene-based non-uniformity correction (SBNUC) routine applied to scene data corresponding to focused scene imagery.

45. (Original) An apparatus for providing corrected values of gain and level coefficients of a set of correction coefficients for a scanning detector array, comprising:

a processor unit coupled to a scanning detector array, the processor unit being configured to:

generate a preliminary level correction factor for each detector channel using a frame of input scene data;

generate a gain correction factor for each detector channel using the frame of input scene data;

generate a gain-induced level correction factor for each detector channel based upon the gain correction factor; and

update existing values of the gain and level coefficients for each detector channel using the preliminary level correction factor, the gain-induced level correction factor, and the gain correction factor for each channel.

46. (New) The apparatus of claim 44, wherein the processor unit is configured to modify first values of the gain and level coefficients by applying said SBNUC routine to the frame of image data collected from out-of-focus multiple temperature imagery.

47. (New) The apparatus of claim 44, wherein the processor unit is configured to determine updated values of the gain and level coefficients by:

acquiring a frame of said scene data corresponding to focused scene imagery;

applying a response correction to the frame of scene data using existing values of the gain and level coefficients to provide a corrected frame of scene data; and

adjusting the existing values of the gain and level coefficients using the SBNUC routine applied to the corrected frame of scene data, wherein the existing values of the gain and level coefficients are replaced with updated values.

48. (New) The apparatus of claim 47, wherein the set of correction coefficients includes moment coefficients, and wherein the processor unit is configured to apply the response correction to the frame of scene data using the moment coefficients.

49. (New) The apparatus of claim 45, wherein the processor unit is configured to generate a preliminary level correction factor for each detector channel, generate a gain correction factor for each detector channel, generate a gain-induced level correction factor for each detector channel, and update existing values of the gain and level coefficients iteratively using successive frames of input scene data such that updated values of the gain and level coefficients converge to respective stable values.

50. (New) The apparatus of claim 45, wherein the processor unit is configure to update existing values of the gain and level coefficients by:

adding the preliminary level correction factor and the gain-induced level correction factor for each channel, thereby forming a sum corresponding to each detector channel;

subtracting the sum from the existing value of the level coefficient for each detector channel to form an updated value of said level coefficient; and

multiplying the existing value of the gain coefficient for each channel by the gain correction factor corresponding to that channel to form an updated value of the gain coefficient for each detector channel.

51. (New) The apparatus of claim 45, wherein the processor unit is configured to generate a preliminary level correction factor for each channel by:

applying a first vertical high pass filter to the frame of input scene data to generate a frame of first high-passed data;

applying a horizontal infinite impulse response filter to the frame of first high-passed data to generate a frame of second high-passed data;

applying thresholding based upon the frame of first high-passed data and the frame of second high-passed data to generate a frame of thresholded data; and

averaging the values of pixels in each row of a frame of data generated from the previous step to generate row averages to provide preliminary level correction factors.

52. (New) The apparatus of claim 51, wherein the processor unit is configured to apply a second vertical high pass filter to the row averages to generate high-passed row averages, the high-passed row averages being used as the preliminary level correction factors.

53. (New) The apparatus of claim 51, wherein the processor unit is configured to apply a vertical null-pixel filter to the frame of thresholded data prior to said averaging step to generate a frame of null-pixel-filtered data, wherein the vertical null-pixel filter identifies null pixels of the frame of thresholded data having values of zero and assigns vertically adjacent pixels within a predetermined number of pixels of the null pixels to have values of zero.

54. (New) The apparatus of claim 51, wherein said thresholding comprises:

for each pixel of the frame of first high-passed data, making a first determination of whether an absolute value of said pixel value of the frame of first high-passed data is greater than zero and less than a first threshold value, and making a second determination of whether an absolute value of a difference between said pixel value of the frame of first high-passed data and a pixel value of a corresponding pixel of the frame of second high-passed data is less than a second threshold value;

assigning a corresponding pixel value of the frame of thresholded data to have said pixel value of the frame of first high-passed data if both the first and second determinations are true; and

giving the corresponding pixel value an assigned value otherwise.

55. (New) The apparatus of claim 45, wherein the processor unit is configured to generate a gain correction factor for each detector channel by:

applying high-pass filtering and thresholding to the frame of input scene data;

for each row of a frame of data generated from the previous step, identifying positive pixel values and negative pixel values;

for each row of the frame of input scene data, calculating a row average of the pixel values of the frame of input scene data corresponding to the positive pixel values (AVG POS), and calculating a row average of the pixel values of the frame of input scene data corresponding to the negative pixel values (AVG NEG);

for each row of the frame of input scene data, comparing AVG POS to AVG NEG; and

determining a gain correction factor for each detector channel corresponding to each row of the frame of input scene data based upon said comparing AVG POS to AVG NEG.

56. (New) The apparatus of claim 55, wherein said gain correction factors are preliminary gain correction factors and wherein the processor unit is configured to apply a high-pass filter to the array of preliminary gain correction factors.

57. (New) The apparatus of claim 55, wherein said comparing and said determining together comprise:

calculating a difference between AVG POS and AVG NEG for each row (i) of the frame of input scene data; and

assigning a value to each gain correction factor, G(i), based upon the following conditions:

if n2 > (AVG POS)-(AVG NEG) > n1, then G(i)=1-Ginc/D;

if n2 > (AVG NEG)-(AVG POS) > n1, then G(i)=1+Ginc/D;

if (AVG POS)-(AVG NEG) > n2, then G(i)=1-Ginc;

if (AVG NEG)-(AVG POS) > n2, then G(i)=1+Ginc;

if (AVG NEG)=0 or if (AVG POS)=0, then G(i)=1; and

G(i)=1 otherwise,

wherein n2>n1, Ginc is a predetermined gain-correction step size, and D is a divisor factor greater than 1.

58. (New) The apparatus of claim 45, wherein the processor unit is configured to generate a gain-induced level correction factor for each detector channel by:

applying high-pass filtering and thresholding to the frame of input scene data to provide a frame of thresholded data;

for a frame of data generated from the previous step, identifying positive pixel values and negative pixel values;

calculating a total average pixel value (TOT AVG) of pixels of the frame of input scene data corresponding to said positive pixel values and said negative pixel values; and

calculating the gain-induced level correction factor for each detector channel based upon TOT AVG and the gain correction factor for each detector channel.

59. (New) The apparatus of claim 58, wherein the gain-induced level correction factor for each detector channel is equal to the product (TOT AVG) x (1 - gain correction factor for each detector channel).

60. (New) A computer-readable carrier having a set of executable instructions embodied therein adapted to cause a processor unit to execute the method according to claim 1.

61. (New) A computer-readable carrier having a set of executable instructions embodied therein adapted to cause a processor unit to execute the method according to claim 2.

62. (New) A computer-readable carrier having a set of executable instructions embodied therein adapted to cause a processor unit to execute the method according to claim 3.

63. (New) A computer-readable carrier having a set of executable instructions embodied therein adapted to cause a processor unit to execute the method according to claim 5.

64. (New) A computer-readable carrier having a set of executable instructions embodied therein adapted to cause a processor unit to execute the method according to claim 12.

65. (New) A computer-readable carrier having a set of executable instructions embodied therein adapted to cause a processor unit to execute the method according to claim 13.

66. (New) A computer-readable carrier having a set of executable instructions embodied therein adapted to cause a processor unit to execute the method according to claim 14.

67. (New) A computer-readable carrier having a set of executable instructions embodied therein adapted to cause a processor unit to execute the method according to claim 15.

68. (New) A computer-readable carrier having a set of executable instructions embodied therein adapted to cause a processor unit to execute the method according to claim 16

69. (New) A computer-readable carrier having a set of executable instructions embodied therein adapted to cause a processor unit to execute the method according to claim 17.

70. (New) A computer-readable carrier having a set of executable instructions embodied therein adapted to cause a processor unit to execute the method according to claim 24.

71. (New) A computer-readable carrier having a set of executable instructions embodied therein adapted to cause a processor unit to execute the method according to claim 28.

72. (New) A computer-readable carrier having a set of executable instructions embodied therein adapted to cause a processor unit to execute the method according to claim 34.

73. (New) A computer-readable carrier having a set of executable instructions embodied therein adapted to cause a processor unit to execute the method according to claim 36.

74. (New) A computer-readable carrier having a set of executable instructions embodied therein adapted to cause a processor unit to execute the method according to claim 40.

75. (New) A computer-readable carrier having a set of executable instructions embodied therein adapted to cause a processor unit to execute the method according to claim 41.